

BOOK REVIEWS

SEEDLINGS OF DICOTYLEDONS, by E. F. de Vogel, with pp. 471. ISBN 90-220-0694-4. Wageningen: Centre for Agricultural Publishing and Documentation, 1980. P.O. Box 4, 6700 AA Wageningen, Netherlands. Dfl. 150.

This book is the result of a three year research project by the author in Indonesia. The project was sponsored by the Netherlands Universities Foundation for International Co-operation.

The first part of the book deals with the structure and diversity of seedlings while attention is also given to seedling terminology and in the historical review valuable references to older and other relevant literature are given. The term 'paracotyledons' which is used for "exposed, thin, green, leaflike, assimilating, 'cotyledons'" might be somewhat premature since insufficient evidence is supplied to justify the distinction between 'true cotyledons' and 'paracotyledons'.

The second part of the text deals with the classification of seedling types. A key to the different types, a semophyletic model showing hypothetical pathways of derivation between the different seedling types and subtypes, as well as detailed descriptions of the 16 different seedling types are given. Chapters pointing out the significance of seedlings in taxonomy and ecology are also included. This part, like the rest of the book, is well illustrated.

The last part consists of detailed descriptions of 150 different seedlings. Each description is illustrated with excellent black and white drawings. References to generic descriptions and distribution are also given. The 20 superb colour plates contribute to the attraction and quality of this book as do the 175 × 245 mm cloth cover and the quality of the paper.

As a whole this book is a valuable contribution to the knowledge of seedlings and the fact that so many South African plant families are represented, makes it a useful publication for local botanists. Although very useful and stimulating, the classification of seedlings in different types and subtypes must not be regarded as final since this work is primarily based on seedlings of tropical trees, whereas a more complete system can be expected once seedlings of all vegetation types are included.

The price of Dfl 150-00 is somewhat discouraging but one still buys good quality when purchasing this book.

P. J. ROBERTSE

FLORA OF NEW ZEALAND, Volume III, by A. J. Healy and E. Edgar, with pp. xlii + 220, 4 colour plates, 31 text figures and 4 maps. Wellington: P. D. Hasselberg, Government Printer, 1980. NZ \$18,50.

The very successful format of Vol. II, published ten years earlier, has been repeated in this volume. The attractive dust jacket, four maps on end papers, good quality paper, clear print and handy size, are all as before. Only the price shows an inflationary leap, from \$4,50 to \$18,50 New Zealand dollars.

A flora dealing almost entirely with adventives (aliens, "weeds") is surely unique. Historic reasons for such a segregation are explained in the preface. J. D. Hooker, in 1855, was so greatly alarmed at the rapidity with which European weeds were being introduced into New Zealand, that he decided to concentrate only on indigenous flora in his *Flora-Nova-Zelandiae*.

This present volume represents a transitional stage from the historic New Zealand treatment to the presently accepted one of including both native and adventive groups in floras.

This volume includes both indigenous and adventive "Cyperaceous, Petalous and Spathaceous Monocotyledons". As native species have already been dealt with in Vol. II, they get limited treatment here, apart from any additional information that may have come to light. A fourth volume will deal with Poaceae, hopefully in the not too distant future.

There is a chronological as well as a subject list of the *Annals of Taxonomic Research on New Zealand Plants* for the years 1969-76 (including earlier titles omitted in Volumes I and II). In addition there is a Bibliography of First Records of the appearance of each adventive species. The praiseworthy compilation of these records must have entailed a most diligent examination of relevant literature.

Keys to the families, genera and species, are clearly set out with well-contrasted numbered couplets. Families have been arranged, with some exceptions, according to Hutchinson's classification. Genera and species have been arranged alphabetically. There is also a useful key to families and some genera, based mainly on vegetative characters. Below the description of each alien species are notes on the country of origin and where the species was first recorded and collected in New Zealand.

The line drawings are excellent, if not abundant. South Africa's contribution to the more colourful adventives in New Zealand, is highlighted by the fact that of the 21 species photographed in colour, no less than 13 are from this country.

Unlike the two-way flow of aliens between Australia and South Africa, New Zealand seems to have suffered far more from plant immigrants from Africa than vice versa. South Africa's contribution to the flora is most noticeable in the family Iridaceae. Of 22 genera listed, only one is indigenous to New Zealand, whereas 17 are from South Africa. Recent name changes in South African Irids have been noted by the authors apart from the two most recent ones. *Gladiolus natalensis* is now *G. dalenii* Geel and *Watsonia ardernei* has been classed as a horticultural cultivar, *Watsonia pyramidata* 'Ardernei'. The only spelling mistake in the South African species is that of *Aponogeton distachyus*, which should have read *A. distachyos*.

The overall appearance, quality and accuracy are of the highest standard and this volume should be extremely useful to any agronomist or botanist interested in the occurrence of weeds in the Southern Hemisphere.

PAULINE BOND

THREATENED PLANTS OF SOUTHERN AFRICA, South African National Scientific Programmes Report No. 45, by A. V. Hall, M. de Winter, B. de Winter and S. A. M. van Oosterhout, with pp. 244. ISBN 0-7988-1780-1. May 1980. Available on request from: C. S. P., C.S.I.R., P.O. Box 395, Pretoria, 0001, R.S.A.

The conservation of threatened plant species and their habitats have received rather limited attention in southern Africa to date perhaps partly because the extent and seriousness of the problem was not generally recognized even in conservation circles. This report makes a considerable contribution towards providing the necessary basic information. It represents the first attempt to assess the threatened plant problem in southern Africa, i.e. the region south of (but excluding) Angola, Zimbabwe and Mozambique.

The bulk of the report consists of lists of the 1915 vascular plant species (approximately 10% of the flora) which are considered by the authors to be either extinct or variously threatened in southern Africa. Three lists are provided, viz. an alphabetical list of threatened plant taxa within families, a list for each country or province (the latter in the case of the Republic of South Africa) and a list for each degree-square within each country or province. Conservation status categories which are equivalent to those used by the IUCN have been assigned to each species and a distinction is made between taxa endemic and non-endemic to the area in question. In addition these lists are cross-referenced by a comprehensive index.

Only a very general attempt is made at analysing the pattern of the threatened plant species problem but the overall pattern is clearly illustrated by tables and a map. The

analysis reveals a particularly high concentration of threatened plant taxa in the Cape Floristic Kingdom (< 1% of the area of southern Africa but with 65% of the threatened species) with other concentrations in Namaqualand and the eastern parts of southern Africa with very low numbers in the interior of South Africa, Namibia and Botswana.

Particularly valuable and of general interest is the chapter on "conservation perspectives" which provides a brief but penetrating account of the rationale for the theory and practice of the conservation of biotic diversity. Conservation strategies that will be necessary to conserve the diversity of the rich southern African flora are discussed and special attention is given to the much neglected aspect, the conservation of intra-specific genetic diversity.

Although the procedures that were followed in compiling the lists are briefly described (mainly reference to herbarium collections and recent revisions) no indication is given of the criteria which were used in the initial selection of species for inclusion in the list. The IUCN conservation status categories could not have been used as a basis for assessment in most cases since the status would not be apparent from herbarium records or from the literature for most species.

The preliminary nature of the report is stressed by the authors who ascribe this mainly to the immature state of the taxonomy of many groups and a lack of recent herbarium collecting for some groups and areas. However, the omission of many distinct and obviously rare species indicates that the selection process has not been as thorough as might have been expected.

The overall impression of this report is that of a carefully edited publication with remarkably few errors although some typographical errors and incorrect locality records were noted, for example *Protea lanceolata* is erroneously listed as occurring in the Caledon degree-square. A valuable reference list is provided which includes many important recent papers on threatened species conservation.

This report should be acquired by anyone interested in the conservation of the southern African flora and who has sufficient botanical knowledge to be able to make a contribution to a better understanding of the status and distribution of the listed species. By its very nature, however, this report would probably not reach as wide a circulation as the subject matter warrants. There is a definitive need for a summary report without the detailed species lists which would read a wider audience.

C. J. BURGERS

TRANSPORT IN PLANTS, by Ulrich Lüttge and Noe Higinbotham, with pp. x + 468, 1 portrait and 180 figures. ISBN 0-540-90383-6. Berlin, Heidelberg, New York: Springer-Verlag, 1979. US \$31.90.

This book has a pleasing appearance. The index is comprehensive and the subject matter is laid out clearly and logically. The authors' style is readable and explanations are presented lucidly so that even those who are not authorities in this field should have no difficulty in understanding concepts presented to them. This has also been achieved by the diagrams which are used freely to illustrate points in the text. The choice of picture on the cover is not good in that transport systems in hemiparasites and fungi do not appear to have received attention in this book. With the exception of the algae, the so-called lower plants have received scant attention, which is unfortunate in a book carrying a title purporting to cover a general field.

The book is divided into four parts. The first part deals with the biophysical background to this subject and the substances which are subject to transport. The chapter on biophysical background forms a useful start to the book, and the descriptions of the principles of the different mechanisms of transport contain sufficient mathematical detail to assist the reader in understanding the concepts without confusing him. The inclusion of a description of various techniques of measurement of relevant parameters is useful. In the third chapter the materials of transport are described, a section which also provides a good basis for understanding the information which follows.

Part II considers transport in relation to cell structure. Here the authors apply the principles elaborated in the early chapters to the situation as it actually exists in cells. There is a very pertinent section on the structure of cell walls and cell membranes. Structure is related to some of the mechanisms described in Chapter 2, and the characterization of carrier mechanisms, which follows on the description of membrane structure, is especially relevant. Several simplified cell models to explain transport mechanisms are reviewed objectively. Although there is experimental and computer evidence in support of the different models, it is made clear to the reader that much remains to be answered still. In Chapter 7 the authors attempt, by reference to specific cell organelles, to illustrate how various transport phenomena form an integral aspect of their physiology. Because of the direct association of transport mechanisms with the various organelles this was found to be a most interesting and informative section. In particular, the reviewer wishes to associate himself with the views expressed by the authors on the importance of active transport processes in transfer cells.

In Part III the authors deal with regulation and control of transport processes by cell metabolism. Respiration and photosynthesis are considered as sources for the provision of energy for active transport mechanisms. Here too the effects of phytochrome and plant hormones in regulating transport processes are also examined. Attention is also focused on the question of coupling between energy-providing reactions in mitochondria and chloroplasts and transport mechanisms at membranes spatially separated from these energy sources. To explain this coupling of energy with transport, biochemical and biophysical controls are considered. This section ties in well with the earlier chapter on the role of respiration and photosynthesis.

The final part describes inter-cellular and inter-organ transport. The occurrence and significance of apoplastic and symplastic transport pathways are examined here. Of special significance to the reviewer is a chapter which deals with correlations between transport processes within a plant as a whole. Because transport systems in cells, tissues and organs must be interdependent, the emphasis on the couplings and interconnections which occur, are welcomed. It is, however, unfortunate that in the short section dealing with salt exclusion in mangroves, a wider selection of references was not utilised. Despite this omission, the bibliography is fairly comprehensive.

This book should suit many tastes. While it is not suitable as an undergraduate textbook, it will be welcomed by specialists in this field and postgraduate students. Transport physiologists should be well pleased that an up-to-date, fairly comprehensive treatise on this subject has been published, while those with more general interests will also find this book most useful. At the price for which this book will sell in this country it represents good value for money and must find a place in all Botany departments.

T. D. STEINKE

GRADIENT MODELING: RESOURCE AND FIRE MANAGEMENT, by S. R. Kessell, with pp. xv + 432, 175 figures and 27 tables. ISBN 3-540-90379-8. Berlin, Heidelberg, New York: Springer-Verlag, 1979. DM 79,50. US \$43.80.

As Stephen R. Kessell was instrumental in developing the system of natural resource data banking which has now come to be known as "Gradient modeling", it is appropriate that he should be the author of this first full-length account.

In his own words, gradient modeling is "... the linkage of gradient analysis, vegetation models with site inventories and computer software to provide a natural resource information system". He gives three reasons for writing the book:— this is the first document to explain the detailed step-by-step development of such systems which he hopes will be of value to those considering the development of similar models for their own resource management problems and areas; it will provide advanced undergraduates, graduate students and field practitioners with a more detailed view of how resource information is gathered, compiled, stratified, stored and used to build resource management systems; and he hopes it will inspire other investigators to develop resource management models and systems through an open, interdisciplinary approach.

The author is largely successful in meeting these aims, reviewing the development of the system and bringing in appropriate ordination theory, as background, on which a large part of his system has been built. Two extant systems, the fire behaviour information integration system in Southern California and the fire management information system for the Northern Rocky Mountains, are described in detail and results of running the models are presented and discussed. Some four other related systems are described briefly.

The data gathering stage is described in full but the reviewer found the computer implementation chapter inadequate, considering that the system is dependent on a computer data banking system for operation. The short chapter of only nine pages merely lists the main subroutines, with one or two lines of description each, gives a simplified program flow chart and two pages of output. Considering the detail given in the rest of the book, this inadequacy is unfortunate. The reviewer would have preferred to have seen a complete computer program listing (or at least a listing of the main routines) instead of 144 pages of gradient population nomograms for Glacier National Park. A small subset of nomograms would have sufficed to illustrate the point made by the author as those given are of very little general interest.

To date, the successful models have been developed, under Kessell's guidance, in temperate North America and in the Californian chaparral, in both cases in well-understood vegetation. Kessell is presently attempting to implement a pilot system in New South Wales, Australia, which would be a good test of the portability of the system to data-poor parts of the world. The reviewer doubts that there is sufficient information available in South Africa to implement the system at present but its usefulness, particularly in the South-Western Cape, to conservation authorities is beyond question. The book itself is good for obtaining an idea of the scope of gradient modeling but inadequate for implementation of the system, should it be so desired, in South Africa.

J. W. MORRIS

SECONDARY PLANT PRODUCTS, edited by E. A. Bell and B. V. Charlwood, with pp. xvi + 674 and 176 figures. ISBN 3-540-09461-X. Berlin, Heidelberg, New York: Springer-Verlag, 1980. Volume 8 in "Encyclopaedia of Plant Physiology, New Series". DM 198. approx. US \$110.90.

This book, which is one of a series edited by A. Pirson and M. H. Zimmermann, is intended primarily for botanists. It does, however, have a very substantial chemical content and should prove to be a useful reference work for the organic natural product chemist.

The opening chapter deals with the historical development of the term, secondary plant products, and is followed by two chapters which examine the difficult problems of their phylogenetic and ecological significance, and the factors which control their production. The remainder of the volume is concerned initially with what are traditionally regarded as the major groups of secondary metabolites: alkaloids, terpenoids, steroids and plant phenolics, and then with groups such as non-protein amino acids, plant amines, cyanogenic glycosides, glucosinolates, betalains, plant lipids and plant carbohydrates.

Throughout the chapters information has been provided concerning the chemistry, biochemistry, taxonomic significance and probable ecological role of the groups of compounds, and in particular considerable attention has been paid to their biosynthesis. Mention is also made of exciting new techniques such as tissue culture, selective breeding and the artificial inducement of genetic changes. With so many topics to deal with it is inevitable that the coverage should be somewhat abridged. However, all the chapters are well referenced, the literature coverage in some cases extending to 1980.

Overall this is a well written book which should appeal to botanists and to the natural product chemist.

W. E. CAMPBELL